Science Tidbits

Riparian Protection:

Pg. 4: A significant body of science, including 1) the Oregon Department of Forestry (ODF) Riparian and Stream Temperature Effectiveness Monitoring Project (RipStream)[1]; 2) *A Statewide Evaluation of Forest Practices Act Effectiveness in Protecting Water Quality* (i.e., the *Sufficiency Analysis*)[2]; and 3) the Governor's Independent Multidisciplinary Science Team (IMST) Report on the adequacy of the Oregon forest practices in recovering salmon and trout[3], indicates that riparian protection around small and medium-sized fish-bearing streams and non-fish-bearing streams in Oregon is not sufficient to achieve and maintain water quality and protect designated uses.

Pg. 4: The 2011 RipStream reports found that FPA riparian protections on private forest lands did not ensure achievement of the Protection of Cold Water (PCW) criterion under the Oregon water quality standard for temperature.[4,5] …The RipStream analysis demonstrated that the chance of a site managed using FPA rules exceeding the PCW criterion between a pre-harvest year and a postharvest year was 40 percent.[6,7]

Pg. 7: Recognizing the need to better protect small and medium Type F streams, the Board [of Forestry] directed ODF to undertake a rule analysis process that could lead to revised riparian protection rules. At its September 2014 meeting, the Board voted unanimously in favor of continuing to analyze what changes might be needed in the Oregon Forest Practice Rules to provide greater buffer protection for medium-sized and small fish-bearing streams on private forest lands.

Forest Roads:

Pg. 8: Legacy roads threaten water quality standards and designated uses due to their location and construction. Historic settlement patterns and relative ease-of-construction led early developers to preferentially locate roads in valley bottoms near streams. Those roads often paralleled low gradient streams (historically the most productive coho habitat) and crossed many

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[1] Three peer-reviewed articles present the results of the RipStream analysis:
Dent, L., D. Vick, K. Abraham, S. Shoenholtz, and S. Johnson. 2008. Summer temperature patterns in headwater streams of the Oregon Coast Range. *Journal of the American Water Resources Association* 44:803–813.
Groom, J.D., L. Dent, and L.J. Madsen. 2011a. Stream temperature change detection for state and private forests in the Oregon Coast Range. *Water Resources Research* 47 W01501. doi:10.1029/2009WR009061.
Groom, J.D., L. Dent, and L.J. Madsen. 2011b. Response of western Oregon stream temperatures to contemporary forest management. *Forest Ecology and Management*. doi:10.1016/j.foreco.2011.07.012.

[2] Oregon Department of Forestry and Oregon Department of Environmental Quality. 2002. *Sufficiency Analysis: A Statewide Evaluation of Forest Practices Act Effectiveness in Protecting Water Quality*. Oregon Department of Forestry and Oregon Department of Environmental Quality.

[3] Independent Multidisciplinary Science Team. 1999. *Recovery of Wild Salmonids in Western Oregon Forests: Oregon Forest Practices Act Rules and the Measures in the Oregon Plan for Salmon and Watersheds*. Technical Report 1999-1 to the Oregon Plan for Salmon and Watersheds, Governor's Natural Resources Office, Salem, OR.

[4] Groom et al., 2011a.

[5] Daugherty, P., and J.D. Groom. 2011. *Update on Private Forests Riparian Function and Stream Temperature (RipStream) Project*. Staff Report; November 3, 2011.

[6] Ibid. 2.

[7] Groom et al., 2011a.

tributaries.[8] …The poorly designed forest roads increase sediment supplied to streams by altering hillslope hydrology, surface runoff, and sediment flux.[9] They represent a chronic source of low-level sediment over time.[10]

Pg. 8: One study [Sessions 1987, citing in IMST] found that forestry roads in Oregon built before 1984 have higher landslide rates than those built later.[11]

Pg. 9: NMFS's scientific analysis for their Endangered Species Act (ESA) section 7 listing for Oregon coast coho salmon also continues to recognize forestry roads, including legacy roads, as a source of sediment and a threat to Oregon coastal coho salmon. NMFS explained that "existing and legacy [forestry] roads can contribute to continued stream degradation over time through restriction of debris flows, sedimentation, restriction of fish passage, and loss of riparian function."[12]

Pg. 9/10: As noted in the Oregon Coastal Coho Assessment,[13] old roads make up the majority of forest roads…

Landslides:

Pg. 12: A number of studies continue to show significant increases in landslide rates after clearcuts compared to unmanaged forests in the Pacific Northwest. For example, one study found that in three out of four areas studied in very steep terrain, landslide densities and erosion volumes were greater in stands that were clearcut during the previous nine years.[14]

Pg. 13: Sakals and Sidle modeled the effect of different harvest methodologies on root cohesion over time…..[15]They concluded that clearcuts on hazardous slopes could increase the number of landslides as well as the probability of larger landslides. They also stated that a management approach requiring the retention of conifers on high-risk slopes would increase root cohesion and reduce the risk of landslides.

Aerial application of Herbicides:

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[8] Nicholas J., B. McIntosh, and E. Bowles. 2005. *Oregon Coastal Coho Assessment. Part 1: Synthesis of the Coastal Coho ESU Assessment.* Oregon Watershed Enhancement Board and Oregon Department of Fish and Wildlife, Salem, OR.

[9] Reid, L. M., and T. Dunne. 1984. Sediment production from forest road surfaces. *Water Resources Research* 20(11):1753-1761; Luce, C.H., and T.A. Black. 1999. Sediment production from forest roads in western Oregon. *Water Resources Research* 35(8):2561-2570; Wemple, B.C., and J.A. Jones. 2003. Runoff production on forest roads in a steep, mountain catchment. *Water Resources Research* 39, doi:10.1029/2002WR001744; Skaugset, A., and M.M. Allen. 1998. *Forestry Road Sedimentation Drainage Monitoring Project for Private and State Lands in Western Oregon.* Prepared for the Oregon Department of Forestry by the Forestry Engineering Department, Oregon State University; Robison, E.G., K. Mills, J. Paul, L. Dent, and A Skaugset. 1999. *Storm Impacts and Landslides of 1996: Final Report.* Forest Practices Technical Report, Vol. 4. Oregon Department of Forestry, Corvallis.

[10] MacDonald, L.H., and D.B.R. Coe. 2008. Road sediment production and delivery: processes and management. *Proceedings of the First World Landslide Forum, International Programme on Landslides and International Strategy for Disaster Reduction.* United Nations University, Tokyo, Japan. pp. 381–384.

[11] Ibid. p. 33, Sessions, 1987.

[12] NOAA National Marine Fisheries Service. 2012. *Scientific Conclusions of the Status Review for Oregon Coast Coho Salmon (Oncorhynchus kisutch).* NOAA Technical Memorandum NMFS-NWFSC-118, June 2012. Pg. 78.

[13] Nicholas et al., 2005.

[14] Robison et al., 1999.

[15] Sakals, M.E., and R.C. Sidle. 2004. A spatial and temporal model of root cohesion in forest soils. *Canadian Journal of Forest Research* 34(4): 950-958.

Pg. 16: Given that non-fish-bearing streams comprise about 70 percent of the total stream length and feed fish-bearing streams, the wide use of herbicides by the forestry industry in coastal Oregon and the lack of any spray or riparian buffers that would help protect non-fish-bearing streams from adverse impacts due to the aerial application of herbicides threaten designated uses in Oregon coastal waters. Small, headwater non-fish-bearing streams play an important role in delivering cold, clean water to downstream fish-bearing streams.[16]

Pg. 17: One of the common indirect adverse effects on water quality and designated uses, particularly cold-water fisheries uses, occurs because herbicides can reduce the growth and biomass of primary producers (i.e., algae and phytoplankton) that form the base of the aquatic food chain. A decrease in primary production (e.g., plants and algae) can have significant effects on consumers, such as salmonids and other animals that depend on the primary producers for food.[17]

Pg. 17: Although it is difficult to predict the magnitude and duration of these impacts on juvenile salmon because the extent of salmonid effects often depend on the interaction with many different parameters (e.g., availability of alternative food sources, water temperature, and other abiotic factors), NMFS has found that some herbicides used in aerial application present [high/significant] risks to salmonid populations protected by Oregon water quality standards and the habitat necessary for life stages protected by those standards.[18]

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[16] Gomi, T., R.C. Sidle, and J.S. Richardson. 2002. Understanding processes and downstream linkages of headwater systems. *Bioscience* 52(10).
[17] Marczak, L.B., T. Sakamaki, S. L. Turvey, I. Deguise, S. L. R. Wood, and J. S. Richardson. 2010. Are forested buffers an effective conservation strategy for riparian fauna? An assessment using meta-analysis. *Ecological Applications* 20:126–134.
[18] NMFS. 2011. *National Marine Fisheries Service Endangered Species Act Section 7 Consultation Biological Opinion Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr BEE, Diuron, Linuron, Captan, and Chlorothalonil.* NOAA National Marine Fisheries Service, June 30, 2011.